

THE PENDING CLAIMS:

1. (currently amended) A cooling system for a fuel cell powered vehicle wherein a fuel cell is mounted as a power source of an electric vehicle motor, the cooling system comprising:

a primary circulation passage arranged to allow primary coolant to be circulated through a primary circulation pump to cool the fuel cell;

a secondary circulation passage arranged to circulate secondary coolant through a secondary circulation pump;

a primary heat exchanger for achieving heat exchange between the primary coolant and the secondary coolant; and

a secondary heat exchanger for achieving heat exchange between the secondary coolant and the flow of outside air;

wherein the primary circulation pump is connected to and driven with a first rotatable shaft of a pump drive motor and the secondary circulation pump is connected to and driven with a second rotatable shaft on an opposite side of the pump drive motor;

wherein the primary circulation pump and the secondary circulation pump are constructed such that flow rates of the primary and secondary circulation pumps are differentiated;

wherein the flow rate of the primary circulation pump is determined such that a temperature of the primary coolant flowing through an inlet side of the primary heat exchanger and a temperature of the primary coolant flowing through an outlet side of the primary heat exchanger are different to remain in a predetermined temperature difference.

and wherein the flow rate of the secondary circulation pump is determined so as to allow a temperature of the primary coolant flowing through an outlet side of the primary heat exchanger to remain at a predetermined temperature.

Claim 2 (canceled)

3. (currently amended) A cooling system for a fuel cell powered vehicle having a fuel cell serving as a power source for propelling an electric vehicle motor, the cooling system comprising:

a primary circulation passage connected to the fuel cell and including a primary circulation pump for circulating primary coolant in the primary circulation passage to maintain the temperature of the fuel cell at a given temperature;

a first heat exchanger having first and second flow passages, with the first flow passage being located in the primary circulation passage;

a secondary circulation passage connected to a heat generating source composed of at least the electric vehicle motor and including a secondary circulation pump for circulating secondary coolant in the secondary circulation passage, with the secondary circulation passage being located in the second flow passage of the first heat exchanger to achieve heat exchange between the primary coolant and the secondary coolant; and

a single pump drive motor including a first rotatable shaft connected to and driving the primary circulation pump and a second rotatable shaft connected to and driving the secondary circulation pump;

wherein the primary circulation pump and the secondary circulation pump are constructed such that flow rates of the primary and secondary circulation pumps are differentiated;

wherein the flow rate of the primary circulation pump is determined such that a temperature of the primary coolant flowing through an inlet side of the primary heat exchanger and a temperature of the primary coolant flowing through an outlet side of the primary heat exchanger are different to remain in a predetermined temperature difference, and wherein the flow rate of the secondary circulation pump is determined so as to allow a temperature of the primary coolant flowing through an outlet side of the primary heat exchanger to remain at a predetermined temperature.

4. (previously presented) A cooling system according to claim 3, further comprising a second heat exchanger located in the secondary circulation passage to achieve heat exchange between the secondary coolant and the flow of outside air.

5. (previously presented) A cooling system for a fuel cell powered vehicle wherein a fuel cell is mounted as a power source of an electric vehicle motor, the cooling system comprising,

a primary circulation passage connected to the fuel cell and including a primary circulation pump for circulating primary coolant in the primary circulation passage to maintain the temperature of the fuel cell at a given temperature;

a first heat exchanger having first and second flow passages, with the first flow passage being located in the primary circulation passage;

a secondary circulation passage connected to a heat generating source composed of at least the electric vehicle motor and including a secondary circulation pump for circulating secondary coolant in the secondary circulation passage, with the secondary circulation passage being located in the second flow passage of the first heat exchanger to achieve heat exchange between the primary coolant and the secondary coolant;

a single pump drive motor including a first rotatable shaft connected to and driving the primary circulation pump and a second rotatable shaft connected to and driving the secondary circulation pump; and

a second heat exchanger located in the secondary circulation passage to achieve heat exchange between the secondary coolant and the flow of outside air;

wherein the secondary circulation passage includes a main circulation flow passage for circulating the secondary coolant through the secondary circulation pump, the first heat exchanger and the second heat exchanger, and a sub-circulation flow passage for circulating the secondary coolant through the secondary circulation pump, the heat generating source and the second heat exchanger.

6. (original) A cooling system according to claim 5, further comprising a third heat exchanger located in the sub-circulation flow passage to achieve heat exchange between the secondary coolant and the flow of outside air.

Claim 7 (canceled)

8. (currently amended) A fuel cell powered vehicle comprising:

a fuel cell serving as a power source;

an electric vehicle motor powered by the fuel cell for propelling the vehicle;

a primary circulation passage connected to the fuel cell and including a primary circulation pump for circulating primary coolant in the primary circulation passage to maintain the temperature of the fuel cell at a given temperature;

a first heat exchanger having first and second flow passages, with the first flow passage being located in the primary circulation passage;

a secondary circulation passage connected to a heat generating source composed of at least the electric vehicle motor and including a secondary circulation pump for circulating secondary coolant in the secondary circulation passage, with the secondary circulation passage being located in the second flow passage of the first heat exchanger to achieve heat exchange between the primary coolant and the secondary coolant; and

a single pump drive motor including a first rotatable shaft connected to and driving the primary circulation pump and a second rotatable shaft connected to and driving the secondary circulation pump;

wherein the primary circulation pump and the secondary circulation pump are constructed such that flow rates of the primary and secondary circulation pumps are differentiated;

wherein the flow rate of the primary circulation pump is determined such that a temperature of the primary coolant flowing through an inlet side of the primary heat exchanger and a temperature of the primary coolant flowing through an outlet side of the primary heat exchanger are different to remain in a predetermined temperature difference, and wherein the flow rate of the secondary circulation pump is determined so as to allow a

temperature of the primary coolant flowing through an outlet side of the primary heat exchanger to remain at a predetermined temperature.

9. (original) A fuel cell powered vehicle according to claim 8, further comprising a second heat exchanger located in the secondary circulation passage to achieve heat exchange between the secondary coolant and the flow of outside air.

10. (previously presented) A fuel cell powered vehicle comprising;
a fuel cell serving as a power source;
an electric vehicle motor powered by the fuel cell for propelling the vehicle;
a primary circulation passage connected to the fuel cell and including a primary circulation pump for circulating primary coolant in the primary circulation passage to maintain the temperature of the fuel cell at a given temperature;

a first heat exchanger having first and second flow passages, with the first flow passage being located in the primary circulation passage;

a secondary circulation passage connected to a heat generating source composed of at least the electric vehicle motor and including a secondary circulation pump for circulating secondary coolant in the secondary circulation passage, with the secondary circulation passage being located in the second flow passage of the first heat exchanger to achieve heat exchange between the primary coolant and the secondary coolant;

a single pump drive motor including a first rotatable shaft connected to and driving the primary circulation pump and a second rotatable shaft connected to and driving the secondary circulation pump; and

a second heat exchanger located in the secondary circulation passage to achieve heat exchange between the secondary coolant and the flow of outside air

wherein the secondary circulation passage includes a main circulation flow passage for circulating the secondary coolant through the secondary circulation pump, the first heat exchanger and the second heat exchanger, and a sub-circulation flow passage for circulating the secondary coolant through the secondary circulation pump, the heat generating source and the second heat exchanger.

11. (previously presented) A fuel cell powered vehicle according to claim 10, further comprising a third heat exchanger located in the sub-circulation flow passage to achieve heat exchange between the secondary coolant and the flow of outside air.

Claim 12 (canceled)

13. (original) A fuel cell powered vehicle according to claim 10 further comprising an intercooler for supplying air to the fuel cell and located in the main circulation flow passage of the secondary circulation passage.

14. (previously presented) A fuel cell powered vehicle according to claim 10, further comprising a supercharger for supplying air to the fuel cell, a power drive unit and a drive motor connected to the supercharger, with both the power drive unit and the drive motor of the supercharger being located in the sub-circulation flow passage of the secondary circulation passage and cooled with the secondary coolant.

15. (previously presented) A cooling system according to claim 1 wherein the primary circulation pump, the secondary circulation pump, and the pump drive motor are arranged collinearly.

Claims 16-17 (canceled)

18. (New) A cooling system for a fuel cell powered vehicle wherein a fuel cell is mounted as a power source of an electric vehicle motor, the cooling system comprising:

a primary circulation passage arranged to allow primary coolant to be circulated through a primary circulation pump to cool the fuel cell;

a secondary circulation passage arranged to circulate secondary coolant through a secondary circulation pump; and

a heat exchanger for achieving heat exchange between the primary coolant and the secondary coolant;

wherein the primary circulation pump and the secondary circulation pump are respectively connected to and driven with a single pump drive motor;

wherein the primary circulation pump and the secondary circulation pump are constructed such that flow rates of the primary and secondary circulation pumps are differentiated,

wherein the flow rate of the primary circulation pump is determined such that a temperature of the primary coolant flowing through an inlet side of the heat exchanger and

a temperature of the primary coolant flowing through an outlet side of the heat exchanger are different to remain in a predetermined temperature difference, and

wherein the flow rate of the secondary circulation pump is determined so as to allow a temperature of the primary coolant flowing through the outlet side of the heat exchanger to remain at a predetermined temperature.